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No. XIX.

## CURVILINEAD.

*The sum of FIVE GUINEAS was this session presented to Mr. JAMES ALDERSON, of Bridge-row, Pimlico, for a Curvilinead, or Instrument for describing Arcs, the Centres of which are not given. The following communication was received from the candidate, and his instrument has been placed in the Society's repository.*

4, Bridge-Row, Pimlico,

SIR,

March 20, 1826.

HEREWITH I beg leave to submit for the approbation of the Society of Arts, &c. a mathematical instrument of my invention called a curvilinead, wherewith to describe regular curve lines, or portions of circles of any diameter, with ease, accuracy, and dispatch.

In my professional avocations as a mechanical and architectural draftsman, I have frequently had occasion to lament the want of such an instrument as this, which is, I trust, perfectly adapted to all the purposes of a drawing-board that practical draftsmen can require for truly delineating segments of circles.

The arms of the instrument *aa*, figs. 1, 2, 3, plate I., are formed of two pieces of well seasoned mahogany, two feet two inches long, one inch broad, and three quarters of an inch thick; but they may be made to any dimensions

as convenience or necessity may dictate. These arms are connected at one end by a brass joint, one-eighth of an inch thick, let into the wood flush with their upper surface. The grooves *bb* in the under surface of the arms, if continued, will intersect each other at the angle, and coincide in the centre of the joint; which, by the curved form given to the end of the sliding bar *jj*, fig. 3, is also the point of the pen or pencil *l*. By this means the segment of a circle of any diameter may be accurately delineated from three given points; namely, the extremities of the chord line of the arc to be described, and the sagitta or rise of the arch; or, indeed, through any three given points within the compass of the instrument.

The index mark *f*, fig. 1, is fixed exactly over the middle of the groove *bb* in the under side of the leg, and by means of the graduated semicircle *dd*, shows the angular distance of the two grooves. The instrument cannot be set to a less angle than  $60^{\circ}$ , see fig. 2, nor is it necessary, as it will at that angle describe an arc equal to three quarters of a circle. The steel screw *p*, figs. 2 and 3, connects the brass joint at the angle, and also perforates and fixes perpendicular thereto the swivel box *i* wherein the bar *jj* slides. When this screw is taken out, the two legs may be brought parallel to each other, and in this state the instrument is rendered very conveniently portable. The other swivel-box *h*, through which the bar *jj* also slides, forms the joint of the two arms *gg* by a similar screw *p*; which are thus enabled to adapt themselves to whatever angle the instrument may be opened to; at the same time, by means of their bearings *qq* on the legs *aa*, they keep the bar perfectly steady.

In order to prepare the instrument for use, the legs are

to be extended to the required angle, and are secured in that position by tightening the binding screw *e*, as well as the screws *q q*; the sliding bar *j j* is then to be adjusted so that the point of the pen or pencil *l*, fig. 3, shall coincide with the prolonged axis of the screw *p*, and it is to be secured in this position by the binding screws *k k* of the swivel boxes *i h*. When the angle is to be changed, all these screws must be previously loosened, a precaution which must be carefully attended to, lest the instrument should be strained or broken.

At the near end of the sliding bar is a vertical hole for the reception of a round pointed peg *r*, fig. 3, of wood, ivory, or metal, just long enough to touch the paper on which the arc is to be described. It serves to preserve the horizontal position of the bar, and affords much facility in working the instrument.

*o o* fig. 1, Are two plates or carriages that support the swivel roller *c c*, which take into the grooves *b b*, and on which the instrument traverses. The various parts of the roller, with its carriage, are shown combined in fig. 3, and separate in section in fig. 5; *a* one of the legs, *b* the groove, *c* the roller, *m* the cheeks between which it hangs, *o* the plate, *n* a point projecting from the under side of the plate, in order to fix it in the drawing-board.

Fig. 4 shows separate the parts which unite at the joint or angle of the instrument.

Parallel arcs being sometimes required, these may readily be drawn by this instrument, by first describing the interior arc, and then sliding the bar *j*, and consequently the pen or pencil that it carries, so far beyond the angle of the instrument as corresponds with the required distance between the two arcs, and then describing the exterior one. Such

arcs, it is true, are not strictly parallel, because the centre of the exterior curve advances a little beyond that of the interior one; but where only small arcs are wanted, the error, practically speaking, is imperceptible. If large arcs with considerable distances between them are required, other methods must be had recourse to.

The semicircle or protractor is divided into one hundred and eighty equal parts, each of which is to be considered as *two* degrees. Therefore, in estimating the quantity contained in an arc described, care must be taken to reckon from zero on the *outer* graduation, towards the index. Thus, if the index stands at  $50^\circ$ ,  $60^\circ$  or  $70^\circ$ , the arcs described contain respectively  $100^\circ$ ,  $120^\circ$ , and  $140^\circ$ .

To obviate the apparent necessity of placing the centre pins at the extremities of the required arc, I would refer the practical draftsman to the two very useful problems in Mr. P. Nicholson's Builders' Directory; namely, prob. 58, p. 58, and prob. 37, p. 39; whereby it is demonstrated, that the points may be placed at the extremities of the paper, and the same arc will be produced.

The same problems also demonstrate that the segment of a circle required may be described and continued to any extent, by this instrument, without increasing the length of the arms; all that is necessary being merely to find different points through which the arc required is to pass.

Finally, I have to state that the instrument possesses the property of describing spiral and irregular curve lines, both curious and useful, by varying and altering the position of the pen or pencil from the centre. This property I did not contemplate in the first instance, and it is probable there may be many others of which I am not aware.

But as I have already exceeded the usual limits, I respectfully forbear further to expatiate, and remain,

Sir,

*A. Aikin, Esq.*

*Secretary, &c. &c.*

Your's, &c.

JAMES ALDERSON.

P.S. Mr. Lealand, mathematical instrument maker, 24, Clarendon-street, Somers-town, will make similar instruments to this for 2*l.* each.

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CERTIFICATES.

SIR,

London, March 27, 1826.

I have seen Mr. Alderson's instrument for describing the segments of circles, and have no hesitation in saying that it is the most perfect of the kind that I have seen.

*A. Aikin, Esq.*

*Secretary, &c. &c.*

PETER NICHOLSON.

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SIR,

Navy Office, March 28, 1826.

I have inspected the instrument invented by Mr. Alderson, and consider it a very valuable invention, particularly for describing circles, or segments of large radius.

*A. Aikin, Esq.*

*Secretary, &c. &c.*

GEO. L. TAYLOR,

*Surveyor of Buildings.*

SIR,

Lambeth, March 26, 1826.

I have examined the instrument invented by Mr. Alderson for producing curved and straight lines, I believe it will prove a most valuable instrument for the purposes intended, and I feel no hesitation in saying I think it the best of its kind I have ever seen.

I am, Sir,

*A. Aikin, Esq.*

&amp;c. &amp;c. &amp;c.

*Secretary, &c. &c.*

HENRY MAUDSLAY.

SIR,

Navy Office, March 28, 1826.

I have inspected the instrument for drawing circles of a great radius, invented by Mr. Alderson, and consider it one of the best I have seen for that purpose.

WM. MILLER.

*A. Aikin, Esq.**Assessor to the Surveyor of  
Buildings.**Secretary, &c. &c.*

Bridge-street, Blackfriars,

SIR,

March 29, 1826.

Having examined and tried Mr. J. Alderson's instrument for striking segments of circles upon a large scale, I feel no hesitation in saying that it is the best instrument I have yet seen for producing the proposed effect.

I am, Sir,

*A. Aikin, Esq.*

&amp;c. &amp;c. &amp;c.

*Secretary, &c. &c.*

M. I. BRUNEL.